

Radiation Hard Wide Temperature Range Mixed-Signal Components, Phase I

Completed Technology Project (2011 - 2011)



Project Introduction

Low temperature survivability, high performance and radiation tolerance of electronics in combination is required for NASA's surface missions. Modern sub-micron CMOS circuits operate at low power supply voltages and offer a very large scale of integration and compatibility with automated design tools at gigabit/second data rates. Unfortunately, their power consumption significantly increases at higher frequencies and single-ended architectures are associated with switching noise and duty cycle distortion. They are also highly susceptible to radiation effects and not suitable for extreme temperatures. On the other hand, differential current-switching circuits utilizing hetero-junction bipolar transistors (HBTs) overcome all named problems but suffer from high supply voltages and DC currents. Our company proposes to develop a set of high-performance, power-efficient, wide temperature range, radiation-hard mixed-signal components representing modifications of the company's existing commercial products. The designs will be based on the proprietary library of CML current switches utilizing HBTs from a commercial BiCMOS technology and will operate within temperature range from -200

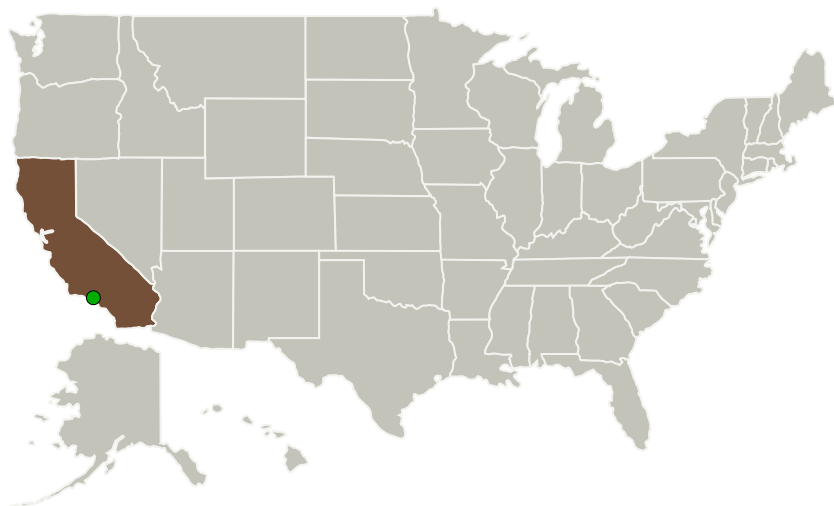
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C and TID>1Mrad. The list of products will include high-speed reprogrammable serializers and deserializers, active delay lines, trans-impedance amplifiers, sample and hold devices, VCSEL drivers, etc. Mission critical ASICs will be analyzed during Phase I and fabricated in Phase II.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Advanced Science and Novel Technology	Lead Organization	Industry	Rancho Palos Verdes, California
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California

Project Transitions

▶ **February 2011:** Project Start

✓ **September 2011:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138435>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Advanced Science and Novel Technology

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

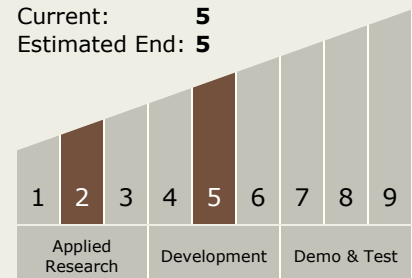
Vladimir Bratov

Technology Maturity (TRL)

Start: 2

Current: 5

Estimated End: 5



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Technology Areas

Primary:

- TX02 Flight Computing and Avionics
 - └ TX02.3 Avionics Tools, Models, and Analysis
 - └ TX02.3.2 Space Radiation Analysis and Modeling

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System